REMARKS

I. Introduction

Upon entry of the present amendment, claims 1-14 will be pending in this application. Claim 12 has been amended to correct its antecedent basis. No new matter has been added. Based on the following remarks, Applicants respectfully request reconsideration and allowance of the pending claims.

II. Abstract

The Examiner objects to the abstract as not being on a separate sheet. This application is a national phase entry of a published PCT application. Based on the materials in PAIR, the abstract is already currently provided on a separate page. To the extent that the Examiner maintains this rejection, clarification of the objection is respectfully requested.

III. Oath or Declaration

The Examiner objects to the oath or declaration as defective. Applicants respectfully direct the Examiner to the Decision on Petition dated July 19, 2006 in the file history of this application. A copy is attached for the Examiner's convenience. The Decision held that the application was accepted without the signature of joint inventor David Thomas Forrest due to his refusal to sign, proven through appropriate documentation. Accordingly, this objection should be withdrawn.

IV. Information Disclosure Statement

The Examiner states that there do not appear to be any references disclosed on the Information Disclosure Statement filed on June 5, 2006. Applicants note that the International Search Report was submitted with the application on June 5, 2006, and the

references cited thereon were cited in a separate Information Disclosure Statement received by the PTO on November 2, 2006. Accordingly, the PCT search report and art cited in connection therewith have all been provided to the Examiner for review and consideration.

V. 35 U.S.C. § 112

The Examiner has rejected claims 1-14 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner states that in claim 1, the phrase, "grains substantially oriented in the planar direction" is indefinite. The Examiner's position is that it is unclear whether the grains are oriented in the planar direction or not because the term "substantially" is not defined by the claim and the specification does not provide a standard for ascertaining the requisite degree, so one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The Examiner has issued similar rejections for claims 2, 8, and 13. Applicants respectfully traverse these rejections and request reconsideration and withdrawal thereof.

According to the PTO rules, the fact that claim language, including terms of degree, may not be precise, does not automatically render the claim indefinite. Acceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in light of the specification. See MPEP 2173.05(b).[1]

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[1] The *In re Wiggins* case cited by the Examiner is not analogous to this application. *In re Wiggins* turned on whether the claimed heterocyclic ring could have other atoms present, and how many substituents the heterocyclic groups could have. The claims were found to be too broad as not supporting other ring members that could possibly fall into the claimed structure. *See In re Wiggins*, 488 F. 2d 538, 541 (CCPA 1973).

Specifically, MPEP § 2173.05(b)(D) states that the term "substantially" is often used in conjunction with another term to describe a particular characteristic of the claimed invention. Courts have held that the term is definite when read in view of general guidelines contained in the specification, *see In re Mattison,* 509 F.2d 563 (CCPA 1975), and when one of ordinary skill in the art would know what is meant by the term, *see Andrew Corp. v. Gabriel Elec.,* 847 F.2d 819 (Fed. Cir. 1988).

In this case, Applicants' specification provides that the phrases "substantially oriented in the planar direction" (claim 1), "oriented in a substantially radial direction" (claim 2), and "grains having their axes of growth substantially parallel to each other" (claim 13) are used to refer to structures that have the primary direction of crystal growth in the plane of the resulting article or in the radial direction. *See* Specification at least at pages 6, 8, 13, 16-17, and 26. Examples of these orientations are also shown in Figures 6, 7, 12, and 15-16. These figures show that the grains are generally oriented in the planar or parallel direction, but that there may be some variations allowed. Thus, the term "substantially" is necessary to define the entire scope of the invention. Based on the general guidelines provided by the specification, Applicants respectfully submit that the phrases are not unclear and respectfully request that the rejection be withdrawn.

Additionally, regarding the phrase "substantially symmetrical stresses" in claim 8, the specification again provides general guidelines of what is intended at pages 14-15. The specification states that any inherent stress exhibited on one side of the ring is balanced by a similar inherent stress on the opposite side of the ring. This is in contrast to the prior art, which can bend or bow due to differences in the stress gradient. *See* Specification at page

15. Applicants respectfully submit that this phrase is not unclear and request that the rejection also be withdrawn.

Moreover, the undersigned presumes that the Examiner would prefer it if the term "substantially" was removed from these claims entirely. However, while the Examiner's likely position is that this would impart precision and clarity to the claim, it may actually have the opposite result in practice. As an illustration of this problem, if the term "substantially" was removed from claim 1, it would offer a tempting invitation for potential infringers to see if they could adjust the alignment of just a few grains, and then argue that their resulting structure does not have *all* grains oriented in the planar direction. A claim that does not acknowledge various inherent deposition anomalies thus runs the risk of becoming unclear and unpredictable in actual practice, instead of being clear and definite. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw these rejections.

Regarding claim 11, the Examiner states that the phrase "FCC Moissanite-3C silicon carbide" is a trademark/trade name and that where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. Applicants submit that this term is an industry standard and not a trademark or trade name. This is technical language describing the SiC structure, well known in the art of X-Ray diffraction. FCC means a Face-Centered Cubic crystal structure. Applicants have attached a page from Mineral Data Publishing describing Moissanite, and in particular showing a 3C polytype, as well as pages from an academic dissertation discussing Moissanite 3C as a mineral name of

SiC. To the extent that the Examiner maintains this rejection, clarification is respectfully requested.

Regarding claim 12, the Examiner states that the phrase "the peak ratio" lacks proper antecedent basis. Appropriate correction has been made.

VI. 35 U.S.C. § 103

The Examiner has rejected claims 1-8 and 13-14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,464,912 to Goela in view of U.S. Patent No. 4,582,561 to Ioku. The Examiner's position is that the Goela patent teaches a silicon carbide ring structure formed by CVD, wherein the structure has a dimension in the planar direction that is larger than the dimension in the normal direction. The Examiner admits, however, that Goela does not explicitly disclose grains substantially oriented in the planar direction, but submits that Ioku teaches a silicon carbide structure formed by CVD with oriented grains. The Examiner's position is that the combination of the Goela and Ioku patents results in the claimed invention. Applicants respectfully traverse this rejection and request reconsideration and withdrawal thereof.

Without acquiescing to the Examiner's position that the references are properly combinable, even if they are properly combined, the claimed invention would not result. As the Examiner has acknowledged, Goela does not discuss the orientation of the grains in the resulting structure. Goela describes suspending ring-like substrates, injecting precursor gases, and forming silicon carbide deposits on both sides of the rings. *See* Goela '912 at col. 6, lines 40-44. Separation of the substrates from the deposits results in the production of two silicon carbide rings. *See* col. 6, lines 62-65. The deposition of the material on top of the

ring-like substrate results in the prior art structure shown in Figure 5 of the present application, reproduced below.

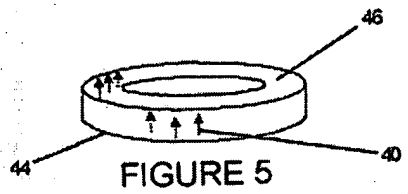

FIGURE 5

The grains cannot be substantially oriented in the planar or radial direction of the structure.

Moreover, combining the Goela patent with the Ioku patent does not provide the missing claimed grain orientation. The Examiner cites Ioku as providing disclosure of oriented grains. The Examiner refers to Ioku's discussion of a silicon carbide seed layer that is formed on a silicon substrate using convention chemical vapor deposition. *See* Ioku, col. 3-4. The seed layer 10 may be dipped into molten silicon 14 to form the second silicon carbide layer 18 (as shown in Ioku Figure 2), or a seed layer 48 may be formed that contacts molten silicon 52 to form second silicon carbide layer 54 on the seed layer 48 (as shown in Ioku Figure 10).

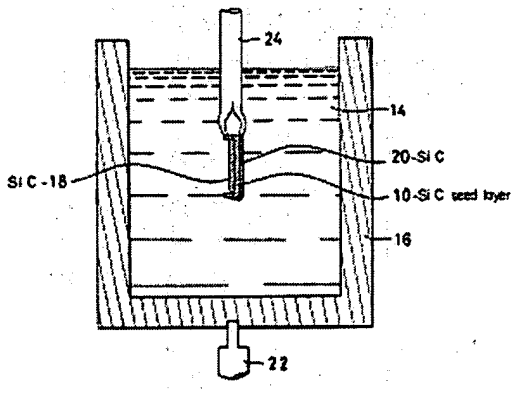

FIG. 2

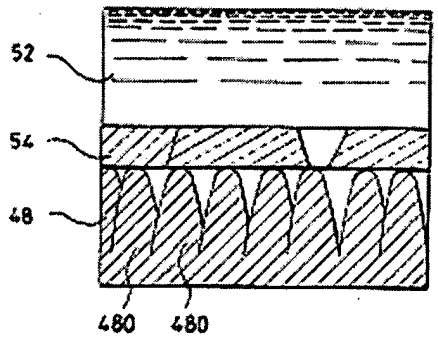

FIG. 10

Both seed layers (which appear to be the portion that the Examiner has characterized as the claimed structure) are formed by conventional chemical vapor deposition (CVD). They are not, however, intended to be the final product, nor do they have the claimed grain orientation. First, the seed layers are only being used as a seed crystal to grow the second silicon carbide layer, which is not a structure formed by CVD. Second, the seed layer 48 itself is formed by material deposited onto silicon substrate 46 as shown in Ioku Figure 3 below. *See* Ioku, col. 6, lines 1-12.

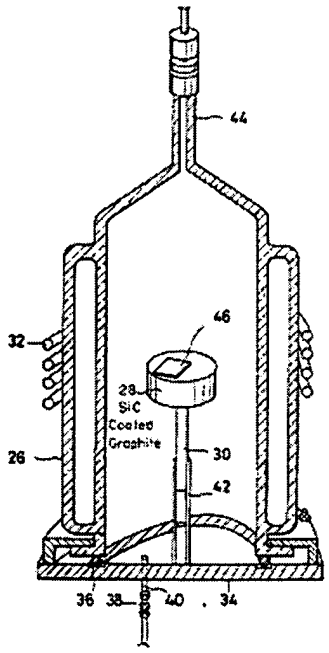

FIG. 3

This again results in the prior art structure shown in Figure 5, above, where the grains are not substantially oriented in the planar or radial direction of the structure.

The Examiner refers to Ioku's discussion that the seed layer should have grains that are aligned in a predetermined orientation at the boundary section confronting the silicon

substrate 12. *See* Ioku, col. 4, lines 1-5. However, referring to a "predetermined orientation" does not anticipate or render the pending claims obvious, at least because there is no suggestion of the claimed orientation. In order to determine what "aligned in a predetermined orientation" is meant by Ioku, one should turn to Ioku col. 6, line 63 – col. 8, line 18:

> At this moment, the mixed layer 48 includes SiC grains (having a diameter around 1000°) aligned in a direction determined by the crystal structure of the silicon substrate 46 at the boundary section confronting the silicon substrate 46. Another seed layer 50 is also formed on the side wall of the silicon substrate 46 as shown in FIG. 6(B). The silicon carbide [SiC] layer formed on a silicon crystal having a crystal surface [111] shows the crystal construction [111]. If the silicon carbide layer is formed on a silicon crystal having a crystal surface [110], the silicon carbide layer shows the crystal construction [110]. That is, the crystal construction of the silicon carbide layer is determined by the crystal construction of the silicon crystal on which the silicon carbide layer is formed. More specifically,
>
> Si<111>//SiC<111>
>
> and Si<1$\check{1}$0>//SiC<1$\check{1}$0>
>
> where: // means parallel.

This section specifically refers to the "crystal structure" and "crystal construction." The notation [xyz] is conventionally used in crystallography to denote a direction vector in real space within a crystal lattice; the notation <xyz> is used to denote a family of directions that are related by symmetry operations.

Accordingly, Ioku is clearing referring to crystallographic alignment of the grains (on the surface of the seed layer as well, not the entire structure), not alignment of the long

direction of the grains (in the structure itself). There is simply no discussion or disclosure in Ioku of grains substantially oriented in the planar direction of the structure.

Ioku's purpose of having a predetermined crystal orientation in the seed is to produce the same orientation in the subsequently grown silicon carbide layer (see, e.g., col. 8). This intended purpose and the Ioku disclosure does not describe or suggest the claimed orientation of the grains. In short, in Ioku, a silicon carbide layer is formed on a seed layer 48 by epitaxial deposition. The silicon carbide layer will be formed by nucleation on the seed surface and grow outwardly from the seed layer, producing a structure with the crystal structures aligned, but with the grains oriented outwardly from the seed surface. Again, this is the precise prior art problem on which Applicants' invention seeks to improve.

Accordingly, even if the Goela and Ioku patents were properly combinable, the resulting structure would not be a structure having grains substantially oriented in the planar direction of the structure. Neither reference, nor their combination, describes this unique configuration. Accordingly, the Examiner is respectfully requested to reconsider and withdraw this rejection, as well as the rejections to the dependent claims.

The Examiner has also rejected claims 1-3, 6-7, 9-10, and 13-14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,939,821 to Goela (Goela '821) in view of Ioku. This rejection is very similar to the above rejection, and the above arguments are incorporated here by reference as well.

CONCLUSION

For at least the above reasons, Applicants respectfully request allowance of the pending claims and issuance of a patent containing these claims in due course. If the Examiner believes there are any issues that can be resolved via a telephone conference, or there are any informalities that can be corrected by an Examiner's amendment, he is invited to contact the undersigned.

Respectfully submitted,

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